

DRAGON USER



The independent Dragon magazine

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May 1988

Explore the Dragon's
hidden depths

Nitemove — thought
provoking strategy

Arcade Arena



Kung Fu — The Master
20 games to be won

DRAGON USER



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How to submit articles:

The quality of the material we can publish in Dragon User each month will, to a very great extent depend on the quality of the submissions that you can make with your Dragon. The Dragon computer was launched onto the market with a powerful version of BASIC, but with very poor software.

Articles which are submitted to Dragon User for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

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Your chance to get in touch with other Dragon Users across the nation — say, the global User group. In Germany books contacts — Paper Gregory — the controversy continues — commodity computer repairs — a clandestine tale — and many more.

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Details of Leeds show — McGowan go to Golden Green — how to stop that mains interference — free Dos manuals from Cummins.

People's Chart

You came, you saw, you voted — a new number one and a new chart entry — it's all there.

Reviews

Jason Orbisons passes judgement on Total Eclipse — (was it worth the wait?) — and goes loopy over Beanzooker — Paracoma Disk utility also put through its paces.

Expert's Arcade Arena 9

Hip . . . by public demand . . . your very own arcade feature devoted to Dragon arcade games — written by the mysterious "Expert". Pokes, hints, tips — we want them!

Machine Code Tutor 10

This month, Orbisons and Campbell hand out the first helping of actual code — can your brain handle it?

Editorial

AT LAST — the sun shines, the warm breezes blow, the bulbs begin to sprout — and early evening TV has got just that little bit worse. It can mean only one thing: Spring has finally arrived . . . and with it, the promise of a flurry of activity for the Dragon and its kin.

As far as events go, we've already had the Dragon "Weekend in Wales" (a moderate success by all accounts) and then there's the Microdeal "1986 Convention" held only a couple of weeks ago (expect a full report next issue). There's the John Penn show in Leeds coming up soon. But that's not all.

Quite a bit of new software seems about to become available. Inventive's Time Lord is well on the way (with mysterious rumours of a new mega-game written by Eddie Steady Go programmer Jason Falouts); Shabby has plans to release four new titles; Boulder Crash, Digger, Thru, plus his answer to Knight Lore (1), Starman Jones and the Temple of Doom. More too from Microdeal, of course, and newcomers Microvision. Lack of software? What lack of software!

Thinking of games — the arcade addicts amongst you might be pleased to notice our newest feature making its first appearance this month — Expert's Arcade Arena. You'll be more pleased to know that it was brought about largely due to the number of letters we received, demanding it!

So if there's a subject you want us to cover — Beginners Basic maybe, C64, Communications, anything — why not drop us a line? We can't promise to answer everyone, but your press won't fall on deaf ears.

But one way or the other — it looks like it's going to be a long, hot summer for the Dragon.

Nitemove

Moving down a gear from our normal arcade action, this month we present an intriguing chess-based puzzle, all in machine code — thanks to Pet McCabe and Colin Turner.

Communication

Problems, problems — this is what it is about. The usual crop of enquiries seeking a little bit of help — can you lend a hand?

Monitor

For those of you following the Machine Code Tutor series, but without an assembly language — this could be what you're looking for — from the keyboard of Peter Whittaker.

Dragon Answers

Brian Dodge takes a lucky dip out of the mail bag and sets to right one or two of those annoying Dragon enigmas.

Adventure Trail

This time, Mike Goward treks boldly where no Dragon reviewer has gone before, into the outer reaches of the Universe — and is still back in time to help a few stranded adventurers.

Competition

Gordon Lee is out to tease your brains again — and with the lure of the chance of winning a copy of Kung Fu — The Master from Shao — how can you resist?

Letters Book

I INTEND to become the most prolific programme of the BBCB editor. This, in spite of the fact that I don't afford a BBCB machine, I have had my Dragon since September 8, 1982, and have completely destroyed my game playing career. It's possible to not do much programming between that time and now. I also have an Electron and a Spectrum, but find that not only does the Dragon have a very conversational and easiest to learn to use processor of the three, I really believe the Dragon to be the superior computer. I have tried (to my eternal shame) to grasp Z80 and 6502, but was only able to find it almost impossible, but now realize that they are totally useless for any serious work in a micro, and totally outdated (I can't afford them).

Please could you tell the title of a book which explains the BBCB to the full, which would take me from beginner to very advanced. A book, which would do as above but with the Dragon in mind. Could you also tell me where to get a Technical Reference manual, giving details of the DIS, system locations, and useful memory addresses. I would also like the same for Dragon DOS.

I hope you'll print this as I have a lot of time, but little patience, and want to become the world's greatest 6502/6503 programmer, as soon as possible.

Tony Saunders
Handsworth
Birmingham

Anyone who would like to help Tony can write to him via Dragon User — meanwhile, how about your full address Tony?

Files

WITH REFERENCE to Mr R. M. Hosse's letter (Dragon User November 1985) I too found in Peter Whitakers program Master Disk Files and found it to be an excellent piece of software. However, I too experienced the problems encountered by R.M.H.

This is the chance to air your views — send your tips, comments and complaints to Letters Page, Dragon User, 12-13 Little Newport Street, London WC2H 4PP.

I spent a morning playing around with the program trying to find any typing errors and could not find any. I then set about debugging the software and revised all of the PEEK/AD commands by preceding them with:

4100 IF ED00=1 THEN 4030 ELSE PEEK AD18
4105 IF ED00=1 THEN 4030 ELSE PEEK AD18

I also replaced Line 2120 with:

4120 GOTO 4000

Thus Line 2010 is the same as:

5010 IF ED00=1 THEN 50 50 AS ELSE PEEK AD18
5015 IF ED00=1 THEN 50 50 AS ELSE PEEK AD18

Line 5020 is replaced with:

5020 GOTO 5000

Once I had completed these alterations I began to put my collection of disks onto file. During this, another problem cropped up. On one of my disks there are a great number of files and so when I used option 2 (new directory) the program crashed with a basic subscript error, thus I completed by reformatting the disk at the 2: prompt (APPEND%). Typing:

A final problem then occurred when searching for a file. This time the program stopped with a TOOO MANY FILES OPEN error so to correct this I entered the following line:

4100 CLOSE#157 A

Finally many thanks to P. Whitakers for an extremely useful program which even in its original form I found very useful indeed and to yourselves for producing an excellent magazine.

Leslie J. Chaffield
32 The Crook
Merton
Tenterden
Kent TN2 8TG

Miner

THANK you for publishing my poker for MOON MINER in January 1980. I have since been contacted by Harry C. Taylor and noted that I missed out Line 2120.

Now I have come up with the best answer — which will run with or without the DOS.

160 IF PEEK(0800)=00000000 PEEK(0800)=00000000
30 18 PEEK(0800)=4423
PICK(0800)=24 PEEK(0800)
22 50 PEEK(0800)=00000000
PAGE=1000

2120 A=1000-16-PAGE

Line 160 now tests to see if the DOS is plugged in and only picks the data address. PAGE will then increment Line 2120 only if the DOS is plugged in, otherwise PAGE will be default to 0.

Anyones wondering why these values above should try altering the values a little and then running the game.

Colin Smith

2 Ashton Gate Garage
Ashton Gate
Bristol BS2 1TA

However, this new calendar was not adopted by Britain until 1752, and the date following 28/11/1752 was 14/01/1752, to compensate for the discrepancy.

I hope this answers Peter's query, and will be back his best!

T Bottemley
52 Bell Vue Road
Sandil
Wakefield
WF1 5BP

Users

WE ARE a growing Dragon-user group with 34 members at the moment. We regularly publish a newsletter. We want to communicate with other Dragon, especially Spanish groups and users and therefore we encourage you to publish our address. (We can answer in English, French, Latin or German.)

Our group was founded when most people thought the Dragon was dead, but the Dragon is still alive as our growing group shows.

Here in Germany we have no magazines with information about the Dragon, we depend totally on you (very good) magazines.

Dragon Computer Gruppe
Bernd Neuer
Dina-Erschließungsstr. 23
D-6324 Neukirchen am
Brand 1
West Germany

Thanks

I WOULD like to take the opportunity of thanking, through your pages, those companies who came to Wales in support of the Dragon at Cardiff April recently. I was a little disappointed that only six or seven companies managed to turn up, but these that did were very helpful and it was a good opportunity to actually see software and hardware being demonstrated.

The Dragon still has a large following here in Wales which, after all, was its birthplace. So if you companies (all there) — you support us, and we will support you.

M T Butler
11 Dinsdale Drive
Tong
Pontypridd

MICRODEAL HAVE DONE IT AGAIN!

THE USA'S CURRENT NO 1

SHOCK TROOPER

The Greatest Hi-Res Graphic Arcade Game
Ever Written for Your Dragon/Tandy Colour 32K



Welcome Shock Trooper Squad Commander! Intelligence has intercepted a coded message revealing a plan to conquer Earth. Four of your Shocktroopers must infiltrate the heavily defended underground enemy base and steal all of their secret TRG-5 attack saucer sub-assemblies. Return them to our scientists for analysis. This secret information is crucial to our defense.



Good Luck!



5 Star Review



The public can't be wrong. Shocktrooper was the TOP seller on our 1985 Roadshow selling twice as many copies as its nearest rival.

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News desk

Show details

DETAILS have just been released concerning the forthcoming show, organised by John Penn Software, as reported in last month's *Dragon User*. The show is to be held in Coast Town Hall on Saturday 31st May, with the doors open from 10am to 4pm. Admission will be £1.00 for adults, 50p for children under 16 and pensioners.

"Clevedon is located just south of Weston-super-Mare and the M51," explained Helen Penn. "It's very accessible and very easy to get to."

Trade supporters at the time of going to press are Bally, Computerbase, Computerage, Eclipse-Fairview, Gossamer, John Penn and Passsoft — although Helen was eager to stress that it was "more than just a buying show". Other activities arranged so far include a demonstration of robotics, programming (by an anonymous Bally programme) and an exhibition of works

performed by The Person Museum at St Albans using a Dragon, who uses a complex graphics program to compose and classify artwork.

John Penn are still offering to pay the expenses of anyone who would like to show off their particular project, so if you think yours might be suitable, give them a ring on Bandon 1042001 5990.

Cumana manual

A FIFTY page publication is now available from Cumana Limited of Quainton, which introduces the reader to the Cumana six-line operating systems for Dragon 32 and 64 personal computers.

A copy of the Dragon Disk Guide is available free on request to Cumana Limited, Pinxton Trading Estate, Broad Street, Quainton, Bucks.

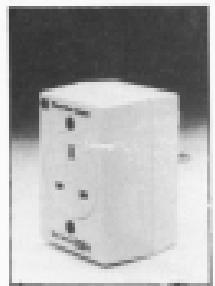
China crisis

PROBLEMS between MacGowan Consultants report their most unusual request yet for their Power Control program — a conversion to print in Hebrew. Always ready for a challenge, proprietor Robert MacGowan is going to have his work cut out, as Hebrew prints out left to right, rather than the conventional left to right. Things could be worse, however, as he commented, "The decoding is required from China."

Those of an Oriental persuasion, and otherwise, contact MacGowan at 6 Amherst Drive, Caythorpe, Grantham, Lincolnshire NG10 2SD.

With all your Dragon! The Modem Filter Adaptor fits directly into an ordinary wall socket and provides a continuous 'handshaking' of the electrical supply to plugged-in appliances.

The Adaptor sells for around £16. From many electrical shops. The unit can be purchased direct from IML, Blue House, High Street, Tenbridge, Kent. Cheques should be made payable to IML in the sum of £17.99.



Plug it!

DURAPLUG Electronics Limited has introduced an inexpensive solution to the problem of mains interference with sensitive electrical equipment.

Dragon User People's Chart Results March 1986

HAPPY 1000! And again — back at the Dragon User People's Chart — and what a month it's been. A new number one, ... with Juxtaposition way out in front ... and a new entry with Shaolin Master from Quickbeam. Who knows what will happen next month? Only time (and you, of course) can tell.

Once again, the programs submitted by chart entrants had us in stitches. Honourable mentions go to David Kinsell for sentiment (first programme on the Dragon), Mark Taylor for topology (which he entered for us) — modesty forbids us from naming Mark Hawksworth (Dragon User is great OX); to the end, the vote went to T. Pilkington of Hythe, lots of laughs for sheer eccentricity (Post the lot to my address). Well done that man, and your prize should be reaching you shortly.

Remember — each request we will be asking you to write for your top five Dragon programmes of the moment — be they games, applications or utilities. Write them down in order of preference on the form opposite (or copy the form out) and send it in to us. Just to make things a little bit more interesting, we're also asking you to make up a phrase constructed from the letters of your own top three (using as many as possible) and we'll pick out the one we consider to be displaying the greatest wit and perspicacity. The winner each month will receive £25 worth of software, donated by Microdeal. Go for it!

| | |
|-------------------------|--------------|
| 1 Juxtaposition | (Wintersoft) |
| 2 Speed Racer | (Microdeal) |
| 3 Shaolin Master | (Quickbeam) |
| 4 Eddie Steady Go | (Incentive) |
| 5 Shocktrooper | (Microdeal) |

Chart Four

Voting for Chart No. 4 closes at 1pm on Friday 10th May 1986. Entries received after that time will not be eligible for inclusion in that month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

My top 5: Voting Month 4

1.
2.
3.
4.
5.

My phrase is:

Name:

Address:

THE DRAGON COMPUTER SHOW COMES TO YORKSHIRE

AT Ossett Town Hall
ON Saturday 31 May

AT 10.00am - 4.00pm

NOT ONLY will the leading retailers of DRAGON computer software, hardware and peripherals (Blaby : Compusense : Computape : Eclipse - Fenmar : Grosvenor : John Penn : Peaksoft) be there, offering some amazing bargains.

BUT ALSO there will be the opportunity to meet the Dragon experts. Look at the displays and watch the demonstrations of ways in which the Dragon is utilised. Have your queries answered by one of the leading Dragon programmers. See how the Verulanium Museum of St. Albans make use of the Dragon in their archaeological investigations, and watch a display of robotic control by the North West users.

Admittance : Adults £1.00
Children under 16 and O.A.P.s 50p

Easy access from M62 and M1 (Junction 40)
Ample car parking
Refreshments

If you would like to take part in the Show, in either of the above capacities, phone John Penn on 04203 5970.

Dragonsoft

Epic Venture

Program: Total Eclipse
Supplier: Eclipse-Ferner
Price: £19.95

BY THIS time you need this review many of you will own copies of Total Eclipse and you will have found out whether or not it has lived up to expectations — I feel it has. It could definitely be described as the most logical game in Dragon history. And the most realistic for ... in all senses of the word.

This game, let us have no bones about it, owes a hell of a lot of galactic units to a game which has yet to see the dawn on the Dragon. Elite. When Elite came out it was hailed as revolutionary, not because of its trading elements, but because they had been combined brilliantly with some of the most complex three-dimensional graphics ever seen on a home computer and a superb flight simulator which finally forced you to fly your way around the galaxy.

Operation Code

Your first helping code — explained step-by-step by Orbaum and Campbell.

AFTER last month's gentle introduction to the art of assembler programming, we are going to get down to some serious damage this issue, with a small program (as promised last month), and a look through the simpler instructions (the ones of note that you and I can understand, rather than the numbers that are tied to the processor).

First, for those who prefer a slightly more coherent approach to the subject, a somewhat small bibliography. We have only come across one book truly excellent for the 6809, and that is "Programming The 6809" by Rodney Zaleski and William Littles, published by Sams (ISBN No. 0-672-2265-0). For the more advanced assembler programmer (what are you reading this for?) the Motorola specification sheet is probably worth a look, although we have never been able to get a copy.

The program listed this month is the clear screen routine mentioned in last month's

article. The format of the listing, working from left to right, is:

Address — In hexadecimal (or hex, this is base sixteen numerology — explanation in a later article), the address of the first byte of the instruction.

Instruction Operation Code — Generally known as the OP Code, or this in less of a mouthful, also shown in hex. This is part of what is passed to the processor to be interpreted.

Operands — Data for use by the processor — varies depending on the instruction.

Line Number — From the Encoder editor, purely decorative.

Label — Allows the line numbers in 6809C, used as a reference for jumps and subroutine calls, as well as for variable references.

Instruction Mnemonics — The (reasonably) understandable version of what is passed to the processor for reference.

Operands — This time in terms of labels or

however the programmer uses it to express it.

At the bottom of the listing is a list of all the labels used, in alphabetical order, with their addresses in hex. Anyway, the only part of the listing we are really interested in is the rightmost. These are four (depending on offset and addressing) columns, which contain the actual code as written by the programmer. This portion is the most stable between different assemblers (no, not different processors, but different Dragon assembler programs), although there may be slight differences in the assembler directives — see later.

The best place to start explaining is probably at the top of the listing. The first two lines, along with the last line, produce no actual code for the processor, and are the aforementioned assembler directives. The second line positions the code at address 20000 in memory, and there will probably be a line very similar to this at the

| | | | | |
|-------|-----------|--------|-------|---------|
| 4E00 | 19 | POINTR | EQU | 1400 |
| 4E20 | 20 | | ORG | 200000 |
| 4E20 | 06 1F | 39 | LDS | B3L |
| 4E22 | 96 50 | 40 | LDA | B120 |
| 4E24 | 96 0400 | 50 | LOOP1 | MF00HTR |
| 4E27 | 30 05 | 60 | LTRK | B,X |
| 4E29 | 87 04 | 70 | LOOP2 | STR |
| 4E2B | 39 0020 | 80 | LTRK | 32,X |
| 4E2E | 9C 0000 | 90 | CMPLX | #\$6000 |
| 4E31 | 25 F0 | 100 | BLD | LOOP1 |
| 4E33 | 100E 0100 | 110 | LDY | B400 |
| 4E37 | 31 3F | 120 | PAUSE | LERY |
| 4E39 | 26 FC | 130 | BHE | PAUSE |
| 4E3B | 59 | 140 | DEC8 | |
| 4E3C | 26 E6 | 150 | SGE | LOOP1 |
| 4E3E | 5F | 160 | CLRFB | |
| 4E3F | 96 00 | 170 | LDR | B3C |
| 4E41 | 01 0400 | 180 | LOOP3 | MF01HTR |
| 4E44 | 30 05 | 190 | LTRK | B,X |
| 4E46 | 87 04 | 200 | LOOP4 | STR |
| 4E48 | 39 0020 | 210 | LTRK | 32,X |
| 4E4B | 9C 0000 | 220 | CMPLX | #\$6000 |
| 4E4E | 25 F0 | 230 | BLD | LOOP4 |
| 4E50 | 100E 0100 | 240 | LDY | B400 |
| 4E54 | 31 3F | 250 | DEPLY | LERY |
| 4E56 | 26 FC | 260 | BHE | DELAY |
| 4E58 | 5A | 270 | INC8 | |
| 4E59 | C1 20 | 280 | CMPLX | #32 |
| 4E5B | 25 E4 | 290 | BLD | LOOP3 |
| 4E5D | 39 | 300 | RTS | |
| 4E5E | | 310 | END | 20000 |
| DEPLY | 4E54 | LOOP1 | 4E24 | LOOP2 |
| LOOP3 | 4E41 | LOOP4 | 4E46 | 4E5B |
| PAUSE | 4E37 | POINTR | 4E40 | |

start of every program. The first line is an equate, and simply means that all references to the word PCINTR (see lines 102 and 180) within the program are replaced by the number #400, or \$A0, the start of the text screen in memory. This serves to make the program easier to read and modify. The last line marks the end of the program, and makes the execution address 2000. In this case, the execution address is the same as the start address, but this does not always have to be the case.

Op-code

And so on to the main code. As we have already described, the registers will assume a degree of familiarity with them, but will try to drive in an understanding of the words Op-code and Op-code.

Line 30 brings us upon, at last, our first Op-code, #C0, which stands for LOAD PCINTR@B (\$Load B, offset branch) and then the Operand #31. The # means "the number." If the command reads LD\$ 31 it would mean "Load the B register with the contents of location 31." The # tells the assembler that it actually means "Load the B register with the number 31." This is very important. The reason that we are loading B with 31 is that we do not need a memory address to be "Offset" after label used on the flowchart; as we have register B spare. (The chances of being able to do this in a big program are about as great as the chances of finding dentistry punctually).

Line 40 is quite an easy one to work out. It means "Load register A with the number #A," op-code is LDA [Load A], operand is #128 (the number 128, 128 is the screen code for a black square. If we store this number at memory locations that correspond to screen positions (the screen begins at \$400, \$100A, the contents of PCINTR as defined by the earlier EDU command) and ends at \$5FF (\$135), a black square will appear there).

Line 60 introduces us to our first label — LOOP1, pretty simple this. It marks the first place we will loop back to — and they told you machine code was hard? The Operand Load A with \$400, which is what the register PCINTR is equal to. If the command was LDX, PCINTR[0], which the #X X would be loaded with the contents of memory location \$400. Following?

Line 64: LEAX BX — this is not so easy to explain as we will gloss over it until we cover the uses of the X and Y registers in a later article. It basically is, in this program adds the contents of register B to the contents of register X. The reason for this vagueness is that LEAX is a complex command with many different uses (Op-codes: LEAX Operand BX).

Line 70, the second loop (thus labeled LOOP2) introduces us to another command STA, which quite logically stands for "Store the contents of register X". Thus STA, #3 means "Store the contents of register A in the memory location pointed to by X." Therefore, on the first run the number 128 (contents of A) will be stored at location \$400 + \$1 (the contents of X), which is the end of the top line on the screen. This is the action line.

Line 80 adds #1 to the X coordinate using the LEAX command exactly as earlier, only with a number instead of a register. Note that there is no need for a # in this case. This command can be signed, i.e., to make #X we use only with LEAX-#X.

Line 80 introduces CMPX. As you might guess this means "Compare X with" ; unless case X is being compared with the address of the bottom of the screen for obvious reasons (if you have understood the flowchart (Op-code: CMPX Operand: #6000), well, CMPX #6000 would compare X with the contents of memory location #6000, as described earlier).

Line 100 introduces a BRANCH command. This branch command will be covered in an article dedicated to these next month, for now, this command means "Branch if X Less than Operand of last compare instruction" thus, if X is lower than #6000 the routing loops.

Line 110: Load register Y with #00.

Line 120: Called pause as this is a loop designed to slow the program down, so that the effect is noticeable. This is achieved by decrementing the Y register, previously

loaded with #00, and using another branch (Line 130, BNNE, to go back and do it again if the result is non-zero).

Line 140: DECrement B, subtracts one from the contents of the B register.

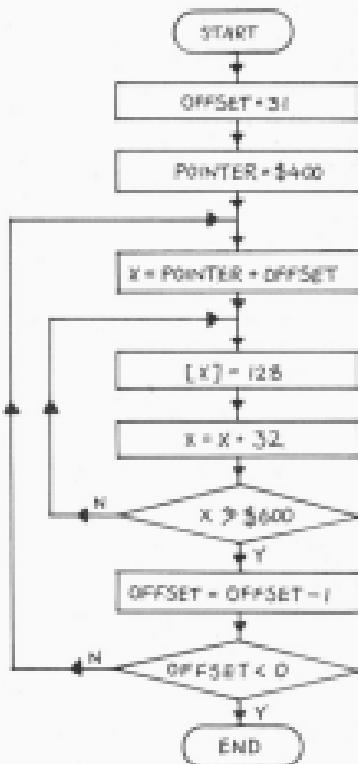
Line 150: "Branch if Greater than or Equal to", back to the setting up of the X register. This instruction controls the movement across the screen.

Line 160: Clear B register. Equivalent to LSH #0. This is to set the clear for the hexagon back across the screen, which is performed by the code in lines 170-200, in much the same way as the previous part.

Line 200: Return from Subroutine. Returns control the routine that called the code.

Well, that about rounds it up for this month; no glossary, although in a few months we will present an extensive list of 6800 instructions and their meanings over two articles in various tables for reference.

Next month we will present a complete explanation of all the assembler directives, a full coverage of addressing modes, and basic numeracy and a tutorial on the Branch instructions.



Knight Games

A running brain-teaser — brought to you by Pat McCabe and Colin Turner

MD ARCADE action this month — just a frustratingly difficult mind challenge, which is simple to play, but hard to complete. The idea is to move the chequered cursor around a standard 8x8 chess board, using the cursor keys, moving as the knight does in chess.

Starting with blue-and-white squares, you must change them to orange and grey by landing on them ... but without attempting to change the same square twice. The computer checks for invalid moves and stops play if there's no room to go — so there's no chance of cheating!

Written in entirely position-independent machine code, the main playing screen is in semi-graphics and includes brief on-screen instructions and move counters. There are two levels of play — Level One starts in the same place every time, Level Two starts at a random square.

To load the program, run the two loaders in Listing One and use it to embed the code given in Listing Two. When finished, save the code to tape with C64 MFM ("Afterburner ROM", format \$0000-\$FFFF). To load it back in, use Commodore's and when the C64 messages appear up, press C64C (\$0000-\$FFFF).

Naturally, if you want to type in code in smaller amounts, run the hex loader and enter the finish address you want to stop at — you then have to tape with **CSAVEH/MATEMANT** into A:000, where "yy" is your finish address. Next time you load in the code, C64 will stop at your

卷之三

However, if all that typing seems too daunting, an enhanced version (with a higher loading screen which auto-exists) is available for the sum of £2.95 from P. McCabe, 20 Spine View Road, Lough, Limerick, Eire.

Looking at the assembler listing [for those with assemblers] you might (guess) that we are newcomers to machine code. The program structure might not be all that it could be, but this is our first attempt — so anyone sticks with this, do as we did — sleep with it and you'll sort them.

```

30 * ENTER EACH LINE OF HER
31 * CIRCUITS, PRESS ENTER THEN
32 * ENTER THE CHECKSUM
33 CLS
34 INPUT "ENTER START ADDRESS":IAH
35 INPUT "ENTER FINISH ADDRESS":IFH
36 FOR I=IAH TO IFH STEP 10
37 PRINT#1,IAH;"";
38 CH=INPUT U$H#H
39 FOR L=1 TO LEN(CH) STEP 2
40 U=ASC(CH"")#HDEC(L),203
41 CH=CH#U#PICKUP(IAH),U
42 PRINT#1,CH;
43 INPUT CH
44 IF CH#HEX(4D) THEN GOTO 33 ELSE GOTO
45 NEXT
46 END
47? SOURCECODE.DPRINT"ERROR - ENTER LINE
48 AGAIN": GOTO 30

```


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185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 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| 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 8010 | 8011 | 8012 | 8013 | 8014 | 8015 | 8016 | 8017 | 8018 | 8019 | 8020 | 8021 | 8022 | 8023 | 8024 | 8025 | 8026 | 8027 | 8028 | 8029 | 8030 | 8031 | 8032 | 8033 | 8034 | 8035 | 8036 | 8037 | 8038 | 8039 | 8040 | 8041 | 8042 | 8043 | 8044 | 8045 | 8046 | 8047 | 8048 | 8049 | 8050 | 8051 | 8052 | 8053 | 8054 | 8055 | 8056 | 8057 | 8058 | 8059 | 8060 | 8061 | 8062 | 8063 | 8064 | 8065 | 8066 | 8067 | 8068 | 8069 | 80610 | 80611 | 80612 | 80613 | 80614 | 80615 | 80616 | 80617 | 80618 | 80619 | 80620 | 80621 | 80622 | 80623 | 80624 | 80625 | 80626 | 80627 | 80628 | 80629 | 80630 | 80631 | 80632 | 80633 | 80634 | 80635 | 80636 | 80637 | 80638 | 80639 | 80640 | 80641 | 80642 | 80643 | 80644 | 80645 | 80646 | 80647 | 80648 | 80649 | 80650 | 80651 | 80652 | 80653 | 80654 | 80655 | 80656 | 80657 | 80658 | 80659 | 80660 | 80661 | 80662 | 80663 | 80664 | 80665 | 80666 | 80667 | 80668 | 80669 | 806610 | 806611 | 806612 | 806613 | 806614 | 806615 | 806616 | 806617 | 806618 | 806619 | 806620 | 806621 | 806622 | 806623 | 806624 | 806625 | 806626 | 806627 | 806628 | 806629 | 806630 | 806631 | 806632 | 806633 | 806634 | 806635 | 806636 | 806637 | 806638 | 806639 | 806640 | 806641 | 806642 | 806643 | 806644 | 806645 | 806646 | 806647 | 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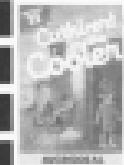
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Problem Need readable hard copy (or tape) of "Snakes Alive!" published in Dragon User, December 1984.
Enquirer Richard Craig, 210 Oxford Road, Westerhope, Newcastle-under-Lyme, Staffs.

Problem Wanted — a shopping program to add/delete numbered items, total prices, store on tape.

Enquirer H E Sharpe, 8 Eastgate Lane, Redmire, Notts.
Problem Does any one know how to get Teletext (Dragon-DOS version) to print multiple copies.

Enquirer John Aggyley, 17 Carr Bridge Avenue, Leeds — also F Jones, 181 Whitley Road, Congleton, Cheshire.

Problem Have Dragon-32 and would like to connect it to an Epson ME80. Can anyone tell me if this is possible?

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Problem How do I advertise to cassette port instead of Centronics port?

Enquirer R Cameron, 26 Somerville Gardens, South Queensferry, W. Lothian.

Problem What changes need to be made to the "Dragon Windows" assembly listing so it can run on a 48K Tandy CoCo running Extended BASIC (July issue)?

Enquirer 50 Lime Avenue, Merton, Walsall, W. Midlands.

Problem Sprint Compiler —

Keyboard Peaks for movement, etc, do not work when BASIC is compiled. (Nothing happens when key is pressed). Help required!

Enquirer M R White, 120 Acre Lane, Dagworth, Essex.

Problems Using Dragon-DOS — still have problems with the "Chain" command — sometimes the screen is frozen, so I have to reset. Can anyone help?

Enquirer P Deuts, Zwanenburgseweg 73, 5600 JE Rotterdam, Holland.

Communication

Block for a routine? Need some obscure equipment? Feeling cut off? Fear not — someone, somewhere can help you! Write down your problem on the coupon below (make it as brief and legible as possible), together with your name and address and send it to Communications, Dragon User, 12-13 Little Newport Street, London WC2H 9EE. We'll publish it as soon as we can — meanwhile, maybe there's someone you can help this month!

Problem

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Taking Control

Your very own machine code monitor — written by Peter Whitaker

ONE OF the limitations of Basic is that it does everything for you, and so hides the operation of the computer from view. If we turn to machine-code programming, we can gain full control of the machine, but we lose all of the safeguards provided by Basic. There are no syntax checks to prevent one from trying to EXEC memory-less code, and the Break key will not stop a runaway program. Even pressing the reset button will not help on every occasion. It is to help reduce these problems (especially for novices following our machine-code series) that this monitor program has been written. The program and its uses can be best explained by EXECing it and exploring what it can do. (The code lies on graphics pages two and three, so it cannot be used with or without a disk drive.) Load in the code from Listing 1, use the Hex Loader (Listing 1) and save into C:\BASIC\16, then TOTY, 3000, 0000, 3000.

Functions

The program is called by EXEC 3000, and will display its option list. The available functions are: Alter memory, Evaluate memory, Fill memory, Copy memory, Display memory as poke text, Check memory words, Register information, Set Breakpoints, Clear Breakpoints, Jump to machine code, Get a machine code subroutine, and Return to Basic. Each is called by pressing the appropriate key. All addresses used by the program must be given in hexadecimal. (Four digits 0000-FFFF.)

<A>-Alter memory from 3000. After pressing the <A>, enter a four byte address from which you wish to start altering the memory contents. The screen then clears to display four columns of information. The first is the memory address, the second is the value stored at that address, the third the character given when the value is printed to the screen, and the fourth is the character given when the value is poked to the screen. The print and poke characters are not always the same. For example, PRINT C\$@0(0) gives a blank, whilst POKE @0 to the screen produces an inverse @. The display will show several memory locations above and below the location to be changed. The memory location to be altered is indicated by the flashing cursor, and can be changed by pressing the up or down cursor keys. To alter the value stored, just type in the value. To return to the option list, press the <Break> key. This routine can be demonstrated by first entering the Basic program 10 CLS@3000, Then EXEC the Monitor, and select the <Alter memory routine. Give either 1000 or 2400 as the start address, depending on whether or not you have a disk drive attached. The screen

should clear to show the Basic program listed down the columns. Now change the values stored, from 300,30000, to 300,30030, and then press the <Break> key. Quit the monitor, and let the Basic program run, enough, it has changed to 10 CLS@3000,30030.

-Examine memory from 3000. Again the program requires a two byte address (3000-FFFF) and then clears to display the information. The screen is divided into rows of blocks of eight locations. Pressing the up or down arrow will scan through the memory one line at a time, whilst pressing <Shift> at the same time will move a whole page. Pressing the <Control> key will switch between displaying the information as ASCII characters or as numbers, whilst pressing the <Break> will, as usual, quit the routine. You call this routine, and enter 3000 as the start address, you can page through the Monitor program. It will probably be pretty meaningless as numbers, but if you press the <Enter> key, it will be displayed as text, and then you will be able to find the location of the monitor messages stored in memory.

A very similar function is provided by the <Print> screen routine. When an address is entered, the computer will display the memory as text POKE'd to the test screen. As mentioned above, printed characters are not always the same as poked characters.

Memory

The memory can be scrolled by pressing any of the arrow keys. Using the <Shift> and up/down arrows will scroll the memory through one screen page (1612 bytes). Pressing the <Control> key will print the address of the top-left byte of the screen display, and then wait for a key press before continuing. Press <Break> to return to the Options screen.

<C>-Fill memory from 3000 to 3FFF with Z0. This routine, as implied, fills a block of memory with a value between 00 and FF. It then returns to the menu screen. This is easily demonstrated by first reserving some graphics memory (PCLEAR) and then filling from 1000 to 3000 with any number from 00 to FF. This can then be checked up on either with the monitor or by displaying the graphics memory test (PAWORD4.5-SOURCE1.0 EXEC#41194). One use of this routine is to fill an area of memory above a machine code program with the value 0F. This is the code for a Software interrupt (see below), and if a software program jumps into this area, it will be redirected to the monitor routine.

<D>-Copy memory from 3000-YYYY to 3000-ZZZZ. This routine copies a block of memory from one location to another. It is a bit like the PCOPY command for the graphics pages, but will work with any areas of memory. It requires the start and end address of the source book, but only the start address of the destination. Once done, the program returns to the menu.

<E>-Memory check from 3000 to YYYY. This routine is used to check that the computer memory is working properly. It works its way from the start address to the end, poking every possible number to each address as it goes. If it then detects to see whether each location has stored each number properly before moving onto the next address. If a location does not store a number properly, for example, the program POKE's a two, but the location stores a seven, it means one of two things. Either the memory location is defective, or it is not RAM but ROM, and its contents are meant to be permanent. (ROM equals \$100000 and above.) If the routine finds a defective memory location it prints a "Failed" message and waits for a key press before

```
10 "HEX LOADER FOR DRAGON MONITOR."
20 "BY PETER WHITAKER."
30 INPUT "START ADDRESS":START
40 INPUT "FINISH ADDRESS":FINISH
50 FOR N=START TO FINISH STEP 1
60 PRINT N;" "
70 TT=0:INPUT RS:Z=8
80 FOR M=1 TO LEN(RS):STEP2
90 LEVAL="&H"&RS(M):POKE N,M,L
100 TT=TT+1:POKE N,M,L
110 Z=Z+1:NEXT M
120 PRINT " = "
130 INPUT T
140 IF T<>TT THEN PRINT T:FOR I=1 TO T:PRINT " ";:NEXT I:GOTO 100
150 HEXT N
```

Listing One

returning to the menu. Otherwise the program works through to the end address, displaying a "Passed" message at the end, and then waits for a key press before returning to the menu. To demonstrate this routine enter the code `0000-0000`, and the routine will respond immediately with a `0000-PASS` message. This is because address `0000` is part of the Page ROM, and not `PASS`. Try again and use addresses `0400-0400`. This is the top line of the test screen, and you will see the memory being tested as the routine runs. A little lower down the screen, you will see the current address, and a `PASS` message. However, if you were to enter `0400-0500` as the block, although the memory would pass at first, as soon as the test reached the part of the screen where the `ADDRESS PASS FAIL` message is printed, the memory would fail the test. This is not due to the memory being defective, but because the program is changing the memory contents to print the message. So if you get a memory failed message, it does not always mean that the memory is not working properly, but a third thing — it is already being used by something else.

Control

It is with the , set Breakpoints command, that we move from the realm of the interesting to the indispensable. As mentioned above, machine code does not have any of the subtleties of Basic to stop programs from running out of control. This routine is a long list of instructions that program. When this routine is called, it will swap the byte at the address specified, for a Software Interrupt (SWI) instruction. The byte replaced is stored in a table for later restoration. When the machine code is then run, it will execute as normal, until it encounters the SWI, where the program is interrupted. All 68000 registers are stored on the "stack" and control is redirected via the interrupt vector to the Register Information routine (see below). The program can set up ten Breakpoints, and these are all displayed on the register information screen.

Pressing the <C>-clears all the break-points set using the -function. The previously inserted SWI commands are replaced by the original code, and the program returns to the menu. SWI commands placed using the <W>-fill command or the <A>-alter memory routine are not affected.

The register information screen called by the **REG** command can also be accessed by pressing the **<-R>** key. The screen will then clear to display the contents of all the stack registers (FCCD, DPL, XLY, U, SPC). When called from the menu screen, they do not reveal very much about what the computer is doing, but when called by a **SWI** command, they give the exact state of the computer as it was before it received the interrupt. This enables one to check out whether or not a particular mode is working in quite the way it should. Pressing the **<-Q>** key will cause the computer to continue from where it had got to. (Make sure that you are returning it to the start of a valid instruction, as the inserted **SWI** command

replaces one byte of the machine code, while some instructions are three bytes long.) Pressing the <C> key will call the alter registers routine, whilst any other key will return the program to the Options screen. If the alter mode is selected, a flashing cursor waits its way down the registers, and you must type in the desired values for each. The value entered into the Program Counter is the address to which the computer will transfer control. However, before the computer quits the routine it will wait for the <-Enter> key to be pressed. Any other key will cause it to run through the register routine again. This is in case you enter the wrong values into the register.

The status of the registers. Press <C> to continue, and see if you can follow the machine code to the results displayed on the screen the next time it is displayed. Once you understand what it is doing, try experimenting with it. Press the <C> key again, enter some values into the register. Make sure that the Condition Code register is set to a safe value, and that the program counter is set to return to the routine.

The last two functions are called by the <J> and <K> keys, and are the "Jump" to a piece of machine code and the "Return" from a machine code subroutine. The first will leave the monitor program, and follow wherever the machine code should lead it, whilst the second will also follow the machine code but return to the monitor when it reaches the end.

To escape from the program press the **<Esc>** key, and the computer will return to its normal functioning. (However, the interrupts and breakpoints will not be reset; so, for example, if you set a breakpoint at location **0107**, the computer will return to the monitor, ignore **Break**, and go to the location **0107**.)

If you do not fancy typing in the program I am willing to supply copies on tape for £2.50. I will also provide a version optimised to reside in high memory rather than on the graphics pages. Send a cheque to Peter Winstanley, 73 Newark Street, Cambridge CB2 1EJ.

Outline

A careful combination of this register and the setting of Breakpoints, the use of machine code can be tested with a fear of them going out of control. To demonstrate this, PCLAB runs the BASIC Monitor. Select the <Address memory line, and using 1000 as the start address, and enter the machine code for pressing Alt (second column from the left). The routine by pressing <Break>, and a <Jump> to the code at 1000. As the routine runs, it will come across the SWI command, and be redirected to the regular monitor routine. Here we can observe

MACHINE CODE LISTING

```

7501          11    PRT
15000         20    ORG $1E00
15000 4F      30    RESTRT CLASS
15001 5F      30    CLRIB
15002 6E0000
15003 10000000
15004 00000001
15005 000002
15006 20000
15007 3123
15011 3F
15112 7E1E00
15113

```

10

5088 102847282028474F= 375
 5088 1285354252475554= 536
 5095 14344E523559595559= 684
 5184 1602885627285168= 622
 5112 13628455649542854= 524
 5120 14F28424153424380= 478
 5128 128383F8828202880= 266
 5136 146494C4C28485204F= 558
 5144 1D1288828444495559= 445
 5152 14C415282846255F4D= 570
 5160 1282012882414444= 355
 5168 152455855288455155= 594
 5176 1414C2882848555555= 399
 5184 128282828285245= 340
 5192 14748535445552205= 577
 5200 15441545553555555= 459
 5208 143432855245474555= 544
 5216 15445523282885555= 244
 5224 120412003245474555= 587
 5232 15455523282885555= 344
 5240 128422855245474555= 587
 5248 15445523282885555= 344
 5256 14445523282885555= 585
 5264 14147452222885555= 214
 5272 128522855245474555= 520
 5280 15445522222885555= 344
 5288 128522855245474555= 531
 5296 15445522222885555= 344
 5304 128522855245474555= 530
 5312 14145522222885555= 215
 5320 128522855245474555= 578

5328 141454P2828855555= 315
 5336 128522855245474555= 522
 5344 1534552285555555= 337
 5352 1422524541428554745= 569
 5360 1423455228555555= 545
 5368 141542122828555555= 379
 5376 128485045552285555= 547
 5384 12820288528555555= 376
 5392 14215428554555555= 551
 5400 14252474282828555= 417
 5408 12848504140404245= 531
 5416 1284645404F52285555= 337
 5424 14252474282828555= 417
 5432 128434F528552888555= 411
 5440 12845542884285555= 559
 5448 1428524F4284285555= 306
 5456 1284288528555555= 459
 5464 128555554348454548= 569
 5472 1288852841444454548= 416
 5480 1285328852885555= 539
 5488 12828715441545555= 540
 5496 128054152852885555= 446
 5504 142442841414445555= 525
 5512 1280485404F52285555= 337
 5520 14252474282828555= 417
 5528 128885284144445555= 414
 5536 14144445245555555= 559
 5544 12020084144445555= 429
 5552 12852285524345555= 517
 5560 12852285524345555= 559
 5568 14245522222855555= 144

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Pure Speculation!

This year's Budget gave a boost to small investors — so Brian Cadge was asked to take stock of Sharebox

IF YOU are already an investor in stocks and shares, or are just thinking of entering the world of "Capital Gains, Dividends and Forecasts" then Sharebox from Harris Micro Software is worth taking a look at.

Sharebox is a share management program which will help you keep on top of all your holdings of stocks and shares, helping to analyse their performance over the year. As with most of Harris' software, Sharebox uses their own custom 40x24 screen and keyboard driven. The character set has been improved and now gives a noticeably clearer looking font. The keyboard driven includes autorepeat and a disabled break key. The key repeat rate can be altered by the user, as can the background colour of the text screen (although the default settings seem to be ideal).

The share management software actually consists of two programs, Sharebox and Sharerep. These can run individually, or called from each other. Sharebox deals with the creation of files and their maintenance, while Sharerep is used for the creation of all reports.

Both programs are menu-driven and include some limited error checking. This consists mainly of having three input types; numeric, date and alphabetic. There is also some checking of numeric values at key points of input, although one point I found interesting was that the program will not accept "30/08/87" as a valid date; "31/08/86" must be used.

Screen

The screen is divided into three sections, the top line displays the option selected, program name, and data type of the input required (eg NUM for numeric), and the bottom line is used for system selection, error and help messages. The main section of the screen is used for the menus, forms and reports. When entering data the cursor keys can be used to edit the current field, or move to the next or previous field. Shift-down arrow gives a line of "help" at the bottom of the screen, which usually consists of an explanation of the data type required, and shift-up arrow returns to the main menu immediately (for aborting invalid entries).

After an initial sign-on message, Sharebox presents a main menu screen consisting of nine options. The first option to be used must be either "Create new file" or "Open-existing file". Up to 50 separate files of various lengths can be opened on each disk (providing there is enough disk space). Each file is selected by its file number, and optional password. A filename is also given, this is printed at the top of reports etc, (but is not the actual filename given to the disk file).

Each share record is identified by a "short name" of up to eight characters, used to sort and retrieve the records. For example, "UNIPRIV" could be used as a short name for "United Press". When retrieving a record, once a match is found for a short name, the user is allowed to accept this record, continue the search or look at the preceding or next record. If no match is found then the "nearest" is offered.

Records

Within the share record are fields for full name, security code, group number, dividend months (up to 4), estimated yield per cent, purchase price, current price, number of shares held, capital gains, tax credits and dividends. The share prices may be quoted in pounds or pence (up to a maximum of 999.99 in pence). There are 30 group numbers, covering most types of shares. The group number can be used with the short-name for selection of particular records within the reports program. Any field of a share record can be changed at a later date (apart from the short names) either by directly selecting the "change record" option, or automatically from within other options.

Sharebox handles 12 "periods" of time, keeping the prices of the shares for each record for each period. Once the 12th period is started, the price of shares in the first is lost and so on. This information is again used within the reports program. The length of time between one period and the next is entirely up to the user, and need not be the same for each period.

Once all the initial data has been entered, it is a simple matter of keeping the files up to

date with share prices for the current period, and any buying or selling you do. One of the problems with Sharebox appears when you select the option to buy some more shares. A share record can only hold one purchase price, and one value for the number of shares held. However, you will more than likely buy more shares at a later date, and at a different price. Harris suggests that users use different share records for different "vintages" of share purchases, and although this will work, it seems a bit of an annoying fudge.

This problem also affects the "Sell Shares" option. This asks for the number of shares to be sold and the selling price. From this it calculates the capital gains made by the sale. This will be incorrect if the shares sold were bought at a different price from the original purchase price. The program gives you the opportunity to input the correct capital gains if this calculation is incorrect. The share record is then updated with the new holding and capital gain for the year. The user is allowed to start a new year at any time, and so zero the current values of dividends, capital gains and tax credits.

Dividends received are entered by selecting option six. The program prompts for the income received and the tax credit. This information is then added into the particular share record.

All reports from the share management system are produced by the other programs on the disk, Sharerep. There are six different reports that the program can produce for each file. The data to be included in a report can be selected by range of short name, and/or range of group number. Some reports also allow selection by range of period or months. All reports

| SHAREBOX | FILE EDITOR | PROGRAM | QUIT |
|------------------------|-------------|---------------------|------|
| MAIN OPTION | | | |
| 1 | - - - | create new File | |
| 2 | - - - | Open Existing File | |
| 3 | - - - | Buy shares | |
| 4 | - - - | Change Share Record | |
| 5 | - - - | sell shares | |
| 6 | - - - | Receive Dividends | |
| 7 | - - - | Change Share Prices | |
| 8 | - - - | Run Reports Program | |
| 9 | - - - | End Program | |
| TYPE CHOICE (L-R) < > | | | |

can be sent either to the screen or printer, output by printer being generally more detailed, taking advantage of the full 80 columns and is automatically paginated 11" paper. One limitation is that only one file may be processed at once; there is no cross-referencing to other files.

Finally, the different reports provided for are as follows. Firstly, there is the "List Share Valuation" option. This produces a report on the valuation of shares, from two different periods, and the profit or loss resulting. The default values for the two periods are the original purchase price (opened) and the current price (market value).

The "Last Capital Gains" option shows all state records which contain capital gains or losses (i.e., during the current year). The "Last Dividends Received" option shows all the dividends and tax credits received by date in the current year, and calculates the yield percentage (the dividends as a percentage of the total value of the account).

A potentially useful report is the "List Income Predictor". This will show all the shares which are expected to pay dividends within the range of months selected, and will estimate the dividend

Price-changes in shares over a period of time can be shown with the next option. The default for the period is from the original purchase to the current price. The report shows the start price, and price and the percentage change.

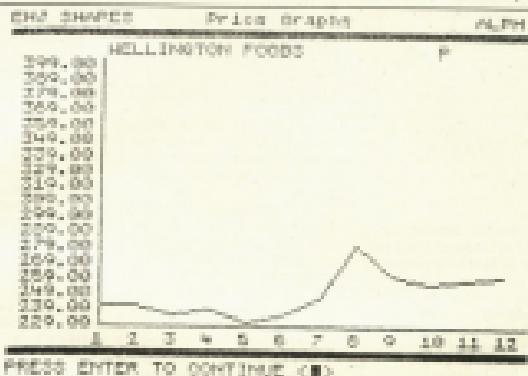
The final report allows a graph to be drawn of the price changes of particular species over the 12 months. This gives a

visual indication of their performance. If the solution is selected then a simple line graph is shown, or a pointer the graph is shown using *** characters. Because of the vast differences in phase prices, different scales are used on different graphs, therefore one has to be careful when comparing output for different shapes to take into account the scale.

Overall, Sharebase functioned extremely well under all tests. The steps are clear and well laid out and the data structure seems sensible. The 30-page A4 manual is up to Parity's usual high standard, explaining each step clearly, with a useful contents

page at the beginning. Apart from the fairly minor problem of having to have different "vintages" of shares, I would happily re-commend Johnstone. The program deserves to do well, but just how large a market there is for software such as this on the Cassette remains to be seen.

Program: Shareware Share Management Program. Requirements: Dragon 32-64 and Dragonboard/Commodore DOS 2.0 and optional printer. Price: \$116.95. From: Harris Micro Software, 48 Alejandro Road, Narragansett, Rhode Island 02882. Tel: 401-783-3381.



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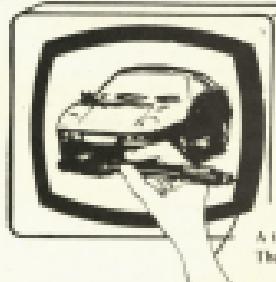
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Dragon Answers

Talking Port

I AM building a speech synthesiser using my Dragon 32 for use in conjunction with the cartridge port. What I need to know is how to send and receive data via the port, i.e. what memory addresses to use. I would also like to know how to output the sound input pin 25 (SIN) to the television.

I have tried to find the answer in many Dragon related books, but none of them even touch on the subject of the cartridge port.

John Carpenter
87 Southern Ryegate
North Ryde
NSW 2113
02 842 5141

The full 8800 address bus is brought out to the cartridge port, so the addresses you need depend entirely on your interface address decoding. To maintain compatibility you should arrange for I/O to be above 8800.

Cartridge sound is selected by clearing bit 3 of SPC00 and setting bits 0 & 1 of SPC01 and bits 2 & 3 of SPC02. The signal applied to Pin 25 should be suitable for feeding directly into the sound multiplexer.

New Command

IN JANUARY 1985 (Dragon User), I have just read that there are three variable routines, *Distance*, *Diskcheck* and *Clipboard*, but there is no variable routine for checking for quotes on the command line, e.g. *VIEW "test"*. What is the routine for checking for variables for the quotes?

Also, is it possible to change existing Basic command to your own commands, i.e. *PRINT MEH*.

Michael Clark
44 Woodstock Road
Harrowood
Liverpool
Merseyside
L79 1QF

If you just want to check for a quote character, then the routine you need is *Clipstr* at address 28244, the B register should contain 24 on entry.

More likely, you need the routine *Getchar* at address 28476,



which will deal with the string variable, whether in quotes or as a variable name. See the *Fireware series* for details on this routine.

It is possible to change the *Basic* commands to your own. To do this you must copy the ROM's command name and address tables down into RAM and alter the positions at 283288 and 281288 accordingly. You can now POKO into the name table to change command names to anything you like, with the constraint that the length of the command must remain the same.

Monitor

RECENTLY I purchased a 'Green Monitor' for my Dragon 32 computer, but it seems that this monitor is not fully compatible with the Dragon.

The problem is that the quality of the picture reproduced on the screen, especially when the Dragon is in the text mode, is such that text appears to 'flicker' quite a lot, and only when I turn it down with the 'contrast' button! I can really read very hardly whatever is on the screen. A friend of mine suggested that I should take the colour chip off its housing in order to improve the quality of picture because it is this chip which is causing all the interference.

Michael Rennigell
36 Loxton St
Jesmond
Newcastle

GENERAL problems could be causing the symptoms you describe with the monitor. Firstly, the Dragon's analogue output has an impedance of 370 ohms, and some monitors require 75 ohms. A suitable lead can solve this problem.

Another cause of flickering is the mains frequency, which must be compatible with both the computer and monitor to keep the display synchronised. However, the Dragon display is never particularly good when fed into a green screen monitor unless the text is inverted — black on bright green just does not seem to work very well.

I certainly would not recommend removing the colour chip, as it seems unlikely that this could cause the problem, and in any case you should seek expert advice before interfering with any chips or you could end up with no display at all!

Recover

I OWN a Dragon 32 and would like to be able to recover Basic programs after using the command *NEW*. I have used POKO 29,20 and POKO 29,30 as I have been told that memory locations 29 and 28 hold the Basic program.

So far I have only been able to recover just some of the old program. I don't know the correct values to reset these locations with. Please could you tell me the right values or tell me how to recover my programs any other way within Basic.

Michael Davies
Dulwich
Southwark
London

Basic programs can be recovered providing that you have not overwrote any program lines after typing *NEW*. Type in the following line as a direct command and wait for the *OK* prompt to appear (this may take several minutes for a long program).

POKO 1-PEEK\$29,209+PEEK\$29,210-25757; IF PEEK\$13=PEEK\$13+1

<-> D TDR/NEXT
Next type the following, again as a direct command:
1-1-28POK0,29,807(1258)-POK0
281-PEEK\$13=256
The program should now be restored, and can be listed.

Disks

I HAVE just recently purchased a Comma Disk Drive and DOS. What I want to know is, will the Dragon's Disk you can buy from software companies work on the Comma Disk system, as I am not sure and I don't wish to buy any disks until I know the answer.

Michael Hollingshead
3 The Mount
Clythorpe
Doncaster
South Yorkshire

CUMAR 2.0 uses the same disk format and commands as Dragon 1.0, and is compatible with most programs, as I say most programs, as I have not had a chance to study the Comma ROM in detail. Basic programs should be no problem, but my best advice would be to check before ordering a program.

Routine

I AM currently writing a database program for the Dragon 32 and Dragon 64. I want to be able to access the extra 2096 byte machine code, but I have no idea how to go about this. Could you please write a small routine to demonstrate how to use the extra RAM?

Sarah Leach

THE EXTRA 2096 BYTES of RAM is paged between 287680 to 642320 by writing to address 89781. The ROM's can be re-selected by writing to 89780. When accessing the extra RAM with Basic-DOS running, it is necessary to disable interrupts as these would cause the program to crash when the ROM's are disabled.

You could incorporate the routine below into your own program. This will return the type of address 2 in RAM in the A register. A similar routine can be written to save a type of address 2 by replacing the LDH with STA.
ADCC #291
STA 89780
LDA ,X
STX 89780
DEC #18
RTS



MIKE GERRARD'S ADVENTURE TRAIL

ONE OF the ways around the lack of new adventure releases for the Dragon is, of course, for people to start writing their own. I do receive home-grown adventures quite often, and though I always respect the amount of hard work that goes into creating them, the majority do have to be sent back with a letter of criticism, as I can't give space in the column to an adventure that isn't fully debugged and that I can't recommend other readers to buy.

Just occasionally, however, one comes along that is a little bit special and I've got to draw people's attention to it. This has been one called *The Hand of Arash* which arrived several months ago, and which has now been published by Quickbeam Software. I'll be taking a longer look at that next month, but this review I'm happy to recommend an adventure called *Space Trek*. It was written by M. Edwards, who's decided to call himself Broomsoft. He told me the adventure took him about 80 hours of programming time, and about 10 hours of preparation, and it's that preparation which shows. A lot of thought has gone into this game, and it shows that you can still come up with something different if you set your mind to it, although I'd like to see the title changed to something a little less obvious.

The first part of the program loads in the optional instructions and mission briefing, and through the cassette menu you're ready with my review copy. It's good to see that the provisional title was quite correct and the instructions on-screen are comprehensive and also invite you to write to Broomsoft for help, if stuck (well, it makes my life easier).

Mission

The scenario might just sound vaguely familiar to you, that the fifth starship, the Endeavour, was launched in 2082 in order to find the previous four, all gone missing. Only two months after the launch the crew (well, most of the crew) had fallen ill with something nasty called Rigelian Fever. The only known cure is an anticoxin distilled from Ryletys, which you don't happen to have in your medicine cabinet right now. Nor do you have the distilling equipment you'll need to produce a perfect and pure anticoxin. Fortunately Ryletys has been located on the planet Holberg by your Science Officer, Mr Salvin, who sounds like something you'd buy at the chemist to no-one strapped lips. You've got permission

from Starfleet HQ to land on Holberg, so over to you the Adventure Player.

The unusual thing about this adventure, for a Dragon game at any rate, is that you actually control four characters. You're given a menu screen initially inviting you to choose the one you start off with, but in playing the game (if you type MENU as a command), you can switch to one of the other characters. As happens in *The Heroes of Kahn* on the Spectrum, Amstrad and other machines, only certain characters can perform certain tasks, so if you're having no luck with one, try asking another to do it. The instructions say that only Salvin can nervoushock someone, and I can't wait to encounter someone who seems worth nervoushocking.

Characters

The characters all start in different places, and the response time as you switch between them is very quick indeed. Captain Christopher James, for instance, begins in the command seat with a row of labelled switches in front of him. He can press his Captain's Com-Unit and exit, going North and East. One quirk of the game is that the screen display could do with tidyng up. "EXIT GO: IN E" doesn't look very good, and neither does the line being printed at the end of the first location description.

Back to the Com-Unit, however, if you examine it you see it has five buttons: three to summon the other three crew members, one to summon a security guard and one to switch the machine off. You might want to summon one of the other members to try their luck with a task you're finding tricky in your current incarnation, so you press the appropriate button and your location description is updated so that you can also see the second character. Switch them to try solving the problem, and naturally they will also see the first character in their location description. Very neat stuff.

With James in the command seat, Salvin at the Scientific Officer's main post, Engineer Hansen McOndle in the engineering section and Spears in the service hatch (he's the doctor, he's the doctor), away you go. The best reason for enjoying this adventure is the trouble that's been taken to give you the feeling that you're actually in a spaceship. The location descriptions are only brief, but there are plenty of them,

interconnecting nicely, and with other characters in different parts of the ship this is all very effective.

You'll need your mapping skills and lots of paper, because there are at least six levels of the ship, with a lift to take you between them. Stairways of the lift on the first floor and yours on the bridge, with exits leading East, West and South back to the lift. There are exits in all directions if you emerge on Level Two (the sick bay), Level Three (a corridor) or Level Six (the transporter room). The other two levels take you to the engineering section and the shuttlecraft. In addition to that, though, and all the locations that are on each level, you can also climb between floors using the service hatches. I found such a hatch on Level Four, went through it and up a ladder, crossed over and climbed down a service vent and there I was on Level Three, where I had a brief encounter in the bridge room.

I can't tell you much about the problems anyway, because I've been spending my time trying to map out this spaceship, just making a note of where various objects like tools and protective clothing are. There is a SAVE option, and apart from the screen layout and a vocabulary that could be extended a bit, I think this is an excellent adventure. Five no doubt that is a healthy climate for Dragon software; the author would have found a larger software house to publish it, but he's duplicated copies himself and they're available for £4 from Broomsoft, 20 Bremerton, Weymouth Garden City, Hants SO2 1PF. Worth every penny, and I hope to be looking at *Space Trek* if next month.

One thought that occurs to me, and which I drew out to any enterprising software houses that might be reading: compilations are the thing at the moment, and a company called Global Software has just published a four-pack of Spectrum adventures that have already been released but rather neglected, which is excellent value at £7.95. Why not the same for Dragon adventures? There's plenty of good material out there, some of it no longer easily available, and I know from the size of my mailing every month that there's still a large potential market. How about it, someone?

Devoting all that space to one new adventure means I'll have to try to cram everything else into the last few columns inches. A lot of readers needing help, as

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maybe you can catch in and sort them out? I can't. This is a two-way thing, remember, so if you've ever received a clue from anyone, see whether you can't do the same for another adventurer.

Ronald Reed, 37 Edgeworth Drive, Fallowfield, Manchester M14 6RU having trouble getting into the police post in El Diablero. Try another colour, Richard.

S. Gassman, 40 Albany Road, Sunnyside, Coventry CV9 6LU asks about Salamander adventures: he was trying to track down Franklin in Houndshead and White Cott of Cover. A few copies of the former are around, but the missing copy I received at the latter responded with an "Out of Memory" card when loaded. I doubt if finished copies were made available as it was at the time when Salamander were cutting back on Dragon releases. Anyone seen one? This reader also thinks he's solved Jerusalem Adventure, but having found treasures here got nowhere to put them (no comments please) and can't score more than 18/40. Over to you.

Julian Baldwin wonders if anyone can tell him he has a copy of the instructions for Dragon Data's Adventure Trilogy, which he bought at the First World Show. All he's gone so far is stuck in an arena and get killed. Any help to Julian at Hopscotch Cottage, Friday Street, Hungerford, Berks GU13 4ZD.

G. Ashenden of 49 Fossaway, Stythe, Liskeard PL12 8NP offers help on Dragon Mountain, but is stuck in Sea Quest from to get the soulless gear, and will need a credit card. Then where is #2 WADDA/WADDS/NIGHT ESDQ/HICA/EENI/WOON/PARKA/BIG is all

I have to say to you Mr Adventurer.

Daren Fan of 12 Preston Court on the wonderfully named Lumberous Estate, Northampton NN2 4HQ, is playing Justaposition and having no luck getting into places like the fort, shaft and pyramids. Looking at my map, I think it just a case of typing *ENTER*, Daren. It might work, perhaps some reader would put Daren right, if only for the pleasure of addressing an envelope to the Lumberous Estate.

N. Morris, 10 Wensum Way, Bellary, St. Albans, Herts HP10 8AY, how to cross the bridge in Freshwater, escape security robots in Lost in Space and enter skull in Mountains of Kef. Dominic Cockshorn, 29 St. John's Road, Rosevear Park, Seaford BN17 9AS; In Black Sandon, what to do with the Bishop's ghost gives you, and what use is the woman?

Gary Cogges, 86 Paragon, Glasgow Heath, Tammie, Staffs various problems on El Diablero and needs a gun in Mansion of Doom. Hayward Heath just wants to see his name in lights, or Dragon Userwayway, but also needs help in several places in Darkoon and Justaposition, and wants to know where to buy Sea Quest, Shenangans, Calisto Island and Black Sandon in a word. Richard, RET5AMHQUJOT. Sorry, can't get out of the habit. Touchstone, that's Unit 5, Belgian Industrial Park, Biggin, Port Talbot, West Glamorgan SA12 7DU. Telephone: Bilton Ferry 622310. Richard is at 66 Newcastle Road, Leek, Staffs.

And I'm at the end of the column. Isn't it clever the way it always finishes at the bottom of the page. I don't know how we do it.

Adventure Contact

To help publish adventures further, we are instituting an Adventure Helpdesk — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Help-

line, 10113 Little Report Street, London WC2H 7PR. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Time to write to as well!

Adventure
Problems

Name
Address

May 88

Adventure Contact

Adventure Justaposition Problem I have been to town and have the Deeds of Docon. What do I do with the crystal ball and the treasure receiver? How do I get the emerald without dying? Name: Stuart Chambers. Address: 13 Heycombe, Burrowton, Blandford, Dorset DT11 4PF.

Adventure Shenangans, Ring of Darkness, Mansion Problem I can't find the Cold Tyran or Krilla. How to get out of the apartment? How to open the door? Name: Ian Greenhalgh. Address: 162 Albert Street, Milnrow, Lancs LA8 4AB.

Adventure Trebboz Problem How do I use the teleport and how do I open the access panel in the environmental control? Name: Paul Marlow. Address: 30 Lime Avenue, Bentley, Wrexham, West Midlands WF2 2LP.

Adventure Franklin's Tomb Problem I have reached the main hall, have been in many rooms, cannot get out. Help! Name: Hywel Perkins. Address: 10 Thomas Street, Trefethen, Newport, Gwent.

Adventure Shenangans Problem How do you get out of the apartment? Name: Russell Pagan. Address: Lowens Cottage, 2 Melbroke, Kirby Stephen, Cumbria.

Adventure Shenangans Problem Can't get past the pub stage. What significance does the maggers and police? What does the balloon say? Name: T. Jenkins. Address: Lyn Hafog, Newydd, Pembrokeshire SA42 0QZ.

Adventure Justaposition Problem Can't find Deeds of Docon or how to get away with the Eldan Emerald. Name: Paul Cisco. Address: 106 Longleat Road, Lower Gorham, Dudley, West Midlands DY3 3EH.

Adventure Lost in Space Problem How do I get the ship to land? Name: Jonathan Gill. Address: 18 Coltingham Green, Little Sutton, South Wirral, Cheshire.

Adventure Justaposition Problem How do you get the emerald? Name: Paul Marsh. Address: 7 Cornmarket Crescent, Clifford, Ramsgate, Kent CT12 5LG.

Adventure Return of the King Problem How can you get the Magic Green Stick from Human Village without them laying land mines? Name: Geoff Lorimer. Address: 1 Despots Drive, Merton Park, Croydon CR2 4LS.

Adventure Mansion of Doom Problem When I shoot the weapon off the route down disappears. What should I do? Name: G. Lutther. Address: 1 Despots Drive, Merton Park, Croydon.

Adventure Justaposition Problem Where is the Velco ID Tag? Where is the lightyear droid? How do you get into the tower? Name: Richard Marsh. Address: 7 Sandholewood, 91 Nicholls-at-Wade, Thame, Kent CT17 0PF.

Adventure Trebboz + Justaposition Problem How do you get across the chasm? How do you get off the second balcony? Name: Mark Cross. Address: 26 Lincoln Road, Washington, Lincoln LN4 1EG.

Adventure Mystery of Java Star Problem Cannot find ruby on ship. Name: Peter Rees.

Address 7 Rochester Avenue, Farnham, Middlesex.

Adventure Covers of Doom Problem How do you keep your flashlight bright? What do you do after you've burnt the road? Name: Peter Rees. Address: 7 Rochester Avenue, Farnham, Middlesex.

Adventure Calisto Island Problem How do I get the cars from the serpent in the temple? How do I get the keys from the locker on the beach? Name: Gary Turner. Address: 103 Westgate Road, Bolton, Lancashire.

Adventure Castle Adventure Problem How do I break the glass in the North East? How do I open the small box? How can I take the small box? Name: Gary Turner. Address as above.

Adventure Queen Problem How do I close the over? Name: Gary Turner. Address as above.

Adventure El Diablero Problem I've been everywhere but can't seem to do anything. Name: Gary Turner. Address: 103 Westgate Road, Bolton, Lancashire.

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The Numbers Game

Gordon Lee makes a connection between cornflakes and maths — with 20 Blaby games at stake!

LADY MCINTYRE concluded with a question of probabilities involving three boxes and six marbles. The answer to the question as posed is that you would have much chance to expect the bet at seven odds, as there is only a one in three chance of you winning the bet provided that the colour of the hidden marble is given as being of the same colour as the one that has been removed. In this case the bet is ready that the box chosen will be one of the two with like-coloured marbles, as opposed to the chance of selecting the single box with the unlike marbles. Looked at another way, as the boxes there are six marbles — three of each colour. If the removed marble is red, then the chosen box cannot be the one with the two white marbles, so two white marbles can be removed from the selection. This means that of the three marbles that are still hidden, only one is white and two are red. Therefore, in this situation always insist the colour is guessed before the marble is removed!

Odds

When assessing odds in everyday life it comes as no surprise to find that the total winning expectation is usually in direct proportion to the odds. For example, a bet of six, one pound, on a horse race will have a relatively high chance of success (as there are a limited number of horses running in a race), but the total amount won will be proportionately small. Conversely, the same amount staked on the lottery pools might be a jackpot, but, of course, the odds against this happening are many, many times greater. The actual prediction of the odds in these cases is difficult due to external influences, but in games such as roulette for example, the winning odds paid are directly related to the probability of the bet winning. Thus, the red/black, even/odd, high/low type of bet pays off at evens, after on a single number will win, of 35 to 1. It is

wrong not for the "zero" compartment on the wheel, these would be classed as "fair" odds when assessed against the probabilities involved. However the "zero" (and in American roulette the "double zero") weights the odds in favour of the casino (and against the punter).

Mathematical literature is particularly rich in the field of probability paradoxes such as the example quoted last month. Usually the paradox depends on an ambiguous or misleading way of presenting the paradox. For instance, I might say that if two dice are thrown, a score of 11 can result in only one way — a five and a six — and a score of 12 also in only one way — a double six. From this the possibility of each is equally likely. Closer examination will reveal that this is not the case as a throw of 11 is possible in two ways and none for 12. The following program illustrates this clearly by displaying all 36 possible scores obtainable with two dice:

```
10 FOR A=1 TO 6: FOR B=1 TO 6:  
20 PRINT A,B:NEXT B:NEXT A
```

A term much used in computing odds and probabilities is "factorial". The factorial of a number is the product of all integers up to and including that number. The factorial of six would be $1 \times 2 \times 3 \times 4 \times 5 \times 6 = 720$. Usually we say "Factorial six" to denote this value. When writing this down the exclamation mark is used, so we would write: $6! = 720$.

Factorials are frequently used for computing the number of different permutations of objects. The competition in this March issue of *Dragon User* was to compute the number of possible arrangements possible with a standard pack of playing cards. Since the top card of the pack can be any one of 52 possible cards, the second card any one of the remaining 51 and so on down the pack, the total number of permutations of cards will be

enormous considering the program.

Make sure that your name and address are clearly printed on your entry — and don't forget to mark your envelope "Mail Competition". Envelopes without the magic words mysteriously disappear on reaching the Editor's desk.

And so to this month's tiebreaker; complete the following phrase in less than 10 words — "I'll pick a lock out of my Dragon because...." As usual, preference will be given to the more inventive efforts.

Prize

This month, we have a treat for all you martial arts fans — 20 copies of the *Blaby F1, Kung-Fu — The Master*. This game, in the ancient traditions of the Eastern mystic arts, allows you to meditate serenely on life, the Universe and Everything — and then smash the living daylights out of a few Dragon sprites! All good clean fun.

Rules

To win a prize, you must first show the answer to this month's competition and how you solved it, with the use of a Basic program written on your Dragon. For the sake of our Tally, please do not send in a

given by 52!, that is, $52 \times 51 \times 50 \times 49 \times \dots$. The final computation is a staggering 68 digit number.

Perhaps more familiar is the type of competition which, for want of a better name, might be called the "cornflakes" competition, due to the fact that they are frequently to be found on the packets of breakfast cereal. To enter, it is necessary to arrange a list of features, usually relating to the price on offer, in correct order — or at least the order dictated upon by a "panel of experts". As an example, if there were 12 features listed then number of possible permutations will be $12!$ — that is $479,001,600$. In other words you would need to submit over 479 million entries to be certain of a winning line. Sometimes the competition is made a little easier if only the top eight features need to be listed — that is, the four least important features can be disregarded. In this case the calculation would be $12!/4$ or $18,684,800$, a reduction on the previous value, but still an enormous amount of stamp-slogging to be sure of sending in a winning entry!

Occasionally, the actual order need not be specified, it being necessary to only name the eight features in any sequence. This increases our winning chances quite considerably as we can divide the previously computed odds by $8!$ — that is, factorial eight. The actual number of possibilities will now be $12!/8!$ = 40 . Now there are only 40 combinations possible.

You should now be well prepared to tackle this month's competition problem. During stocktaking at the local toy shop, a tray containing 80 ordinary dice was knocked to the floor.

The dice scattered around, coming to rest with an assortment of faces on top. Can you determine what the odds would be of all 36 of the dice coming to rest with the same uppermost? For the answer we need to know the exact computation down to the last digit!

gave: Justin Hines of Hean, Staffs; Steven Woolhouse of Bromley, Kent; G. A. Hunt of Crowthorne, Berks; M. Armitage of Buntingstoke; Simon Autrey of Swindon, Wilts; Guy Nielsen of Chelmsford; S. A. Newson of Audlem, Shropshire; Jon Sampson of Oldham; David F. J. Taylor of Ashton Road, Middleborough, Cleveland; Luis Martinez of San Sebastian, Spain; Rachel Edmunds of Scunthorpe, Lincolnshire; P. D. Maddocks of Taplow, Berks; A. Wilson of BPFPO 108. Congratulations one and all.

February winners

In February, we were giving away *Incantation* games — and the lucky winners were as follows: Charles Daly of County Cork, Eire; Hyatt Roberts of Pontypridd, Mid Glamorgan;

Finally, for those who still might be struggling away — the answer to the puzzle was $840445 + 74216 = 915261$.

JOHN PENN

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| Mac Address Book | MSI | Disk | £29.99 | £29.99 | |
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| MSI Disk | MSI | Disk | £29.99 | £29.99 | |
| Black Control | MSI | Disk | £29.99 | £29.99 | |
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